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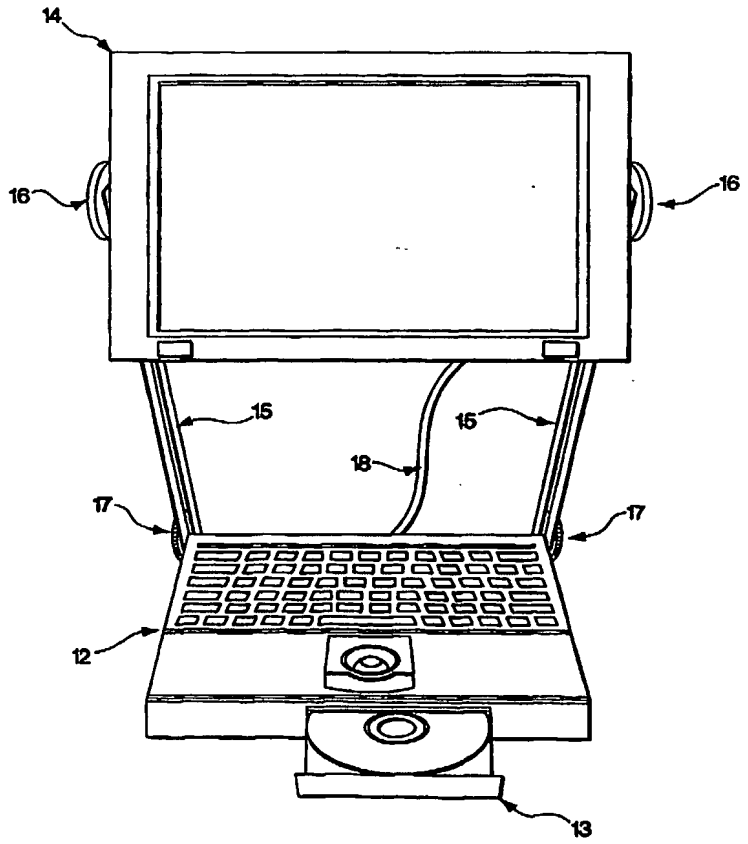
(54) Title: ADJUSTABLE SCREEN LAP–TOP COMPUTER

(57) Abstract

An adjustable display lap–top computer is disclosed. The lap–top display's height and angular position can be adjusted. One or more arms connect the display to the lap–top. The arms may, for example, be telescoping, adjusting, hinged or flexible and may be slidably attached to the display and hinged.



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ADJUSTABLE SCREEN LAP-TOP COMPUTER

Related Application

I claim, under 35 U.S.C. § 119(e), the benefit of provisional application serial No. 60/043,114, entitled ADJUSTABLE SCREEN LAPTOP COMPUTER, filed on April 9, 1997.

Field of the Invention

The present invention relates to lap-top computer systems and, more particularly, to a lap-top computer that has a display with adjustable height and positioning.

Discussion of the Related Art

Use of lap-top computers has become widespread. Lap-top computers currently use a "clam shell design." Thus, the computer and keyboard are provided in one unit, and the screen display is provided in another unit. The display and the keyboard/computer are connected together by a hinge. The computer can be opened and closed by pivoting the display hinge -- opening and closing like a clam shell. One example of such a computer is shown in United States Patent No. 4,667,299.

Summary of the Invention

According to one embodiment of the invention, a lap-top computer is shown that includes a keyboard unit, a display unit and a first support arm coupled to the display unit and to the keyboard unit. The support arm may be used to position the display at varying heights from the keyboard unit. The support arm may be a telescoping support arm. The supporting arm can be rotatably coupled to the display unit and to the keyboard unit. The support arm may be coupled to the side or back of the display unit.

According to another embodiment of the present invention, a lap-top computer is shown that includes a keyboard unit, a display unit removably coupled to the keyboard unit and a mechanism to connect the display to another surface when the display unit is uncoupled from the keyboard unit.

According to another embodiment of the present invention, a lap-top computer is shown that includes a keyboard unit, a display unit and a mechanism for connecting the keyboard unit to the display unit, that permits the height of the display unit to be adjusted relative to the keyboard unit.

Brief Description of the Drawings

FIG. 1 is a lap-top computer according to one embodiment of the invention;

FIG. 2 is a side view of the embodiment disclosed in FIG. 1, with the display closed;

FIG. 3 is a side view of the embodiment of FIG. 1, with the display opened;

FIG. 4 illustrates one possible mechanism for attaching a display to a supporting arm, according to one embodiment of the present invention;

FIG. 5 illustrates two alternative mechanisms for adjustably attaching a display to a support arm, according to one embodiment of the present invention;

FIG. 6 illustrates a lap-top computer, according to another embodiment of the present invention;

FIG. 7 illustrates a lap-top computer, according to another embodiment of the present invention;

FIG. 8 illustrates a lap-top computer, according to another embodiment of the present invention;

FIG. 9 illustrates a lap-top computer, according to another embodiment of the present invention; and

FIG. 10 illustrates a lap-top computer, according to another embodiment of the present invention;.

Detailed Description

Current lap-tops have a fixed hinge between the display and the keyboard. This can lead to a number of severe disadvantages. For example, the display must always be located near the user's hands. This prevents the user from positioning the display close to the user's face, for easier reading of fine print on the display. In addition, in many circumstances, the display can be difficult to use. For example, use of a lap-top computer on an airplane can be very difficult. There can be insufficient room to position the lap-top comfortably for typing with the hands, and also position the display at an angle that can be seen by the user. In many cases, the user is forced to hunch over or adopt some other uncomfortable position in order to use the lap-top.

FIG. 1 illustrates a lap-top computer according to one embodiment of the present invention. The computer includes components that are known in the art. This includes a keyboard unit 12. Within the keyboard unit 12, is a computer processor, memory and other devices as known in the art. The keyboard unit 12 may also include various ports and peripheral

devices, such as CD drive 13. The lap-top computer also includes a display 14 built according to one of any of a number of techniques known in the art.

Rather than hinging the display 14 to the keyboard unit 12, the display can be attached to the keyboard using supporting arms 15. As explained below, varying numbers of supporting arms can be used, including only a single supporting arm. In addition, as described below, the supporting arms can be configured in any of a number of ways, including use of a wide-hinged supporting arm or a freely-adjustable, flexible supporting arm.

The supporting arm 15 is connected to the keyboard unit 12 in a way that the arms 15 can be rotated relative to the keyboard unit 12. As explained in greater detail below, knobs 17 can be used to tighten the arms into an angular position relative to the keyboard 12. Of course, any of a number of other methods could be used to attach the arms 15 to the keyboard unit 12 with or without knobs. For example, a friction mounting could be used which permits, but resists, movement. In this way, the arms could be adjusted to the appropriate angle by the user without having to screw or unscrew knobs 17.

The display unit 14 is attached to the supporting arms using knobs 16. As for knob 17, a variety of mechanisms could be used to attach the supporting arms 15 to the display unit 14. As explained in greater detail below, the display can be moved up and down the arms 15. In addition, the angle of the display relative to the arms 15 can also be adjusted. Thus, the display can be put into any desirable position, by changing the angle of the arms relative to the keyboard, the angle of the arms relative to the display, and the position of the display along the length of the arms.

The display is also coupled to the processor located in the keyboard unit 12 by a cord 18. The cord 18 can be loose, as shown in FIG. 1. This cord can be any standard PC monitor cord. The cord can either be attached at all times to keyboard unit 12 and display 14, or can use standard plugs so that the user can attach and disconnect the cord at the user's election. The cord may also be coupled to a spring rewind (not shown), coupled or incorporated into the keyboard unit 12 or display unit 14 to keep the cord in a fairly tight condition. In other embodiments, the cord (or contacts to establish the communication) can be integrated into one of the supporting arms 15.

FIG. 2 illustrates a side view of the embodiment of FIG. 1, with the lap-top in its closed position. As can be seen, the keyboard unit 12 and the display unit 14 are placed in alignment, similar to a way a conventional clam shell lap-top is closed with the display and the keyboard

unit in alignment. The support arm 15 runs across the side of the lap-top. In this configuration, the length of the support arm is approximately the same length as the side of the lap-top. Shorter arms could, of course, be incorporated. Longer arms could be achieved either by simply attaching a longer arm, or by providing telescoping arms.

Knob 17 is used to tighten or loosen the support arm from the keyboard unit 12. This permits the angle of the support arm relative to the keyboard unit to be freely adjusted. The knob 17 can simply screw into the base unit 12 in order to lock it into place. In the alternative, tesselated washers could be used to provide fixed rigid angles. The support arms 15 may be mounted so that there is friction in the adjustment, even when the knob 17 is loosened. This will permit users to more easily adjust the desired angular position of the arm 15 relative to the keyboard 12, before tightening knob 17 to lock the arm into place.

Knob 16 is used to attach the support arms to the display 14. As described in greater detail with reference to FIG. 4, the knob can be attached along track 21.

Tightening knobs 16 and 17 can hold the lap-top in its closed position. In the alternative, or in addition, latches may be provided on the sides or front and back of the computer to hold the computer in its closed position.

FIG. 3 illustrates a side view of the embodiment of FIGS. 1 and 2, with the lap-top opened and ready for use. Knob 17, where the support arm is mounted to the keyboard unit 12, preferably rotates, but cannot slide up and down. As shown in FIG. 3, however, the height of the display unit (in one embodiment) can be adjusted. Thus, the junction of the support arm 15 with the display unit 14 can be adjusted to occur anywhere along track 21. Similarly, the junction of the support arm and the display can be adjusted along the length of the support arm 15. Finally, as shown, the angular orientation of the display relative to the support arm can be adjusted.

FIG. 4 illustrates one manner in which the supporting arm 15 can be adjustably connected to the display unit 14. The side of the display unit 14 includes an interior-cavity 44. This cavity also has an open slot 21. Inside of the cavity is a threaded knob 41. The knob 16 has a threaded screw 43 coupled to the knob. Preferably, the screw and knob 41 are constructed so that the knob 16 cannot be fully unscrewed from the knob 41. When the knob 16 is loosened, the display can be adjustably positioned up and down the arm 15, up and down the side of the display (in the cavity 44), and the angular orientation of the display 14 can be changed. When the knob 16 is tightened, the friction between the knob 16, supporting arm 15, display unit 14 and threaded knob 41 prevents the display unit from moving relative to the arm.

The top and bottom of the display unit 44, may have cavity 44 closed. This will prevent the knob 41 from ever being removed from the cavity 44. Alternatively, one or both ends of the cavity 44 may be left open. This would permit the display unit to be removed from the supporting arms. The user could then position the display unit wherever the user wishes. Toward this end, and as illustrated in FIG. 6, a mechanism might be included on the back of the lap-top for affixing the display unit to a surface when the display unit is not coupled to the lap-top.

FIG. 5 illustrates two other embodiments for adjusting the positioning of the junction of the display unit relative to the supporting arm. In these embodiments, the arms 15 each have teeth 51. A unit 55 can be used to adjust positioning. The unit 55 includes gears 53a and 53b that have teeth that mesh with each other and with the teeth on the arms 15. By attaching a knob to one of these gears, and rotating the knob, the positioning of the unit 55 can be adjusted relative to the arms 15. The display unit would be rotatably attached to unit 55. This would permit the user to adjust the height of the display, relative to the arm, by turning the knob. The display could then also be rotated through the separate mount to unit 55.

Unit 58 illustrates another adjustable mechanism. The interior of unit 58 includes two locking units 56. The locking units 56 include teeth that mesh with the teeth 51 on the supporting arm 15. A spring 57 forces the locking units into the teeth of the supporting arms 51. Two tabs 59 permit the user to pinch the locking units toward each other, removing the teeth of the locking units 56 from the teeth of the supporting arms 51. The user, with the locking units pinched together, would then be able to slide the display up and down the arms. The display unit is rotatably attached to unit 58, permitting the display unit to have its angular position relative to the arms 15 adjusted.

FIG. 6 illustrates another embodiment of the lap-top computer according to the present invention. In this embodiment, the two arms 61 are coupled to the display unit on the back of the display. The support arms 61 are attached to the keyboard unit 12 by friction hinges 61a. Each support arm is telescoping, as illustrated at 62. The display unit 14 includes tracks 63 on the back of the display unit 14. The connection of the display unit 14 to the supporting arm 61 is made at a point along these tracks, and as generally described above. Thus, the track 63 may include teeth on its edges 64. A locking unit 65 can then be used to selectively engage the teeth and fix the position of the locking unit 65 with respect to the display unit 14. Each supporting arm 61 is coupled to the locking unit 65 by a friction hinge, permitting the angular orientation of

the display unit 14 relative to the supporting arms 61 to be adjusted. The arms 61 can be dimensioned so that, when the lap-top is in its fully closed position, the telescoping arms fit within the tracks 63. In addition, the display unit may include latches 69, to accommodate hinges 61A when the lap-top is in a closed position.

Rather than two separate arms, a single support arm may be used, configured in the same manner as shown in FIG. 6. In this case, a wider supporting arm, positioned in the center of the widths of the keyboard unit 12 and display unit 14, might be used.

The back of the display unit 14 may also include a mechanism 68 to attach the display unit to other surfaces (such as when the lap-top is removed from the supporting arms 61). This can be a clip, a clamp, a bracket, a velcro strip, a fabric loop, or other apparatus that can be used to hang the display from any available surface.

FIG. 7 is another embodiment of a lap-top computer according to the present invention. In this embodiment, the display unit 14 is connected to the keyboard unit 12 by a single hinged arm. In FIG. 7, the hinged arm runs along the back of the lap-top computer. Each segment of the arm is connected to either the keyboard unit 12, display unit 14, or adjacent segment of the hinged arm, by a friction hinge 71. This permits the height and angular orientation of the display unit to be readily adjusted. The keyboard unit 12 may include a notch 73 to accommodate the hinged segments of the supporting arm when the display unit is in the fully closed position.

FIG. 8 illustrates a further embodiment of the lap-top computer according the present invention. In this embodiment, the keyboard unit 12 is coupled to the display unit 14 by flexible support arms 81. These support arms are sufficiently rigid to support the display unit 14, but can also be bent to one of a variety of positions. This type of arm is known to one of skill in the art, in other contexts. For example, snake flashlights and adjustable desk lamps often use this type of arm. Optionally, the arms 81 can be attached to the display 14 using friction hinges 82. Similarly, the arms 81 may be attached to the keyboard unit 12 using friction hinges 82. The arms 81 may be attached either to the bottom of the keyboard unit 14, or to the back of the keyboard unit 14, near the bottom, or in any other suitable configuration. The flexible arms 81 may be attached to the keyboard unit also at the back of the unit or, in the alternative, at the top of the keyboard unit located towards the rear of the keyboard unit, or in any other suitable configuration. Optionally, the display 14 could be attached to the keyboard unit 12 using only one flexible arm 81.

FIG. 9 illustrates a further embodiment of the lap-top computer according to the present invention. In this embodiment, the keyboard unit 12 is coupled to the display unit 14 by retractable slide arms 91. The retractable slide arms 91 are connected to the keyboard unit 12 and the display unit 14 with knobs, friction washers or other mechanisms in a similar manner to that described above. Each retractable slide arm is composed of several components including a male arm 93, a female arm 94, and either a knob or friction washer 95. The knob or friction washer 95 is used to secure the two arms in the desired position after adjusting the display height. The display 14 height is adjusted by engaging the male arm 93 relative to the female arm 94. As illustrated, arms 91 are attached to the display unit 14 using knobs 16 that permit the angle of the display to be adjusted. The arm mechanism of FIG. 9 may also be coupled to the display and keyboard unit in other ways, including those described above.

FIG. 10 illustrates a further embodiment of the lap-top computer according to the present invention. In this embodiment, the keyboard unit 12 is coupled to the display unit 14 by telescopic piston arm 101. The telescopic arms 101 are connected to the keyboard unit 12 and the display unit 14 with either knobs, friction washers, or other mechanisms known in the art. Tessellated washers could also be used. Each telescopic piston arm is composed of several components known in the art. A friction sleeve inside of the piston arm 101 allows the user to move the piston arm up and down thereby adjusting the display height. The display position and angle is also adjustable relative to the keyboard. The arm mechanism of FIG. 10 may also be coupled to the display and keyboard unit in other ways, including those described above.

Having thus described at least one illustrative embodiment of the invention, various modifications and improvements will readily occur to those skilled in the art and are intended to be within the scope of the invention. Accordingly, the foregoing description is by way of example only and is not intended as limiting. The invention is limited only as defined in the following claims and the equivalents thereto.

CLAIMS

What is claimed is:

1. A lap-top computer comprising:
a keyboard unit
a display unit; and
a first support arm coupled to the display unit and to the keyboard unit.

2. The lap-top computer of claim 1, wherein the first support arm is a telescoping support arm.

3. The lap-top computer of claim 1, wherein the display unit is rotatably coupled to the first support arm to permit at least some axial rotation of the display unit relative to the first support arm.

4. The lap-top computer of claim 3, wherein the display unit is adjustably coupled to the first support arm to permit the height of the display unit, relative to the keyboard unit, to be adjusted.

5. The lap-top computer of claim 4, wherein the first support arm is a telescoping support arm.

6. The lap-top computer of claim 4, wherein:
the display unit is coupled to the first support arm at a display junction point on the display unit and at an arm junction point on the first support arm; and
the position of the display junction point is adjustable to a plurality of points along a height of the display unit.

7. The lap-top computer of claim 4, wherein:
the display unit is coupled to the first support arm at a display junction point on the display unit and at an arm junction point on the first support arm; and

the position of the arm junction point is adjustable to a plurality of points along the length of the first support arm.

8. The lap-top computer of claim 6, wherein the position of the arm junction point is adjustable to a plurality of points along a length of the first support arm.

9. The lap-top computer of claim 1, further comprising a second support arm coupled to the display unit and to the keyboard unit.

10. The lap-top computer of claim 9, wherein the first arm is coupled to a first side of the keyboard unit and the second arm is coupled to a second side of the keyboard unit.

11. The lap-top computer of claim 9, wherein the first arm and the second arm are each coupled to the back of the display unit.

12. The lap-top computer of claim 1, wherein the first support arm is coupled to the back of the display.

13. The lap-top computer of claim 12, wherein a back of the display unit includes a track and the first support arm is coupled to the display unit at a display coupling point along the track

14. The lap-top computer of claim 13, wherein a position of the display coupling point is adjustable along a length of the track.

15. The lap-top computer of claim 1, wherein the support arm comprises a hinged arm, the hinged arm comprising a plurality of hinge segments, the hinge segments being coupled together in series by a plurality of hinges, the hinged arm having a first end coupled to the keyboard unit and a second end coupled to the display unit.

16. The lap-top computer of claim 15, wherein the hinged arm has a width substantially equal to a width of the keyboard unit and a width of the display unit.

17. The lap-top computer of claim 1, wherein the first support arm comprises a flexible arm that is sufficiently rigid to support the weight of the display unit.

18. A lap-top computer comprising:

a keyboard unit

a display unit removably coupled to the keyboard unit; and

means for connecting the display to another surface when the display unit is uncoupled from the keyboard unit.

19. A lap-top computer comprising:

a keyboard unit

a display unit; and

means for connecting the keyboard unit to the display unit, permitting the height of the display unit to be adjusted relative to the keyboard unit.

20. The lap-top computer of claim 19, further comprising means for holding the display unit and the keyboard unit in a fixed position relative to each other, when the lap-top is in a closed configuration.

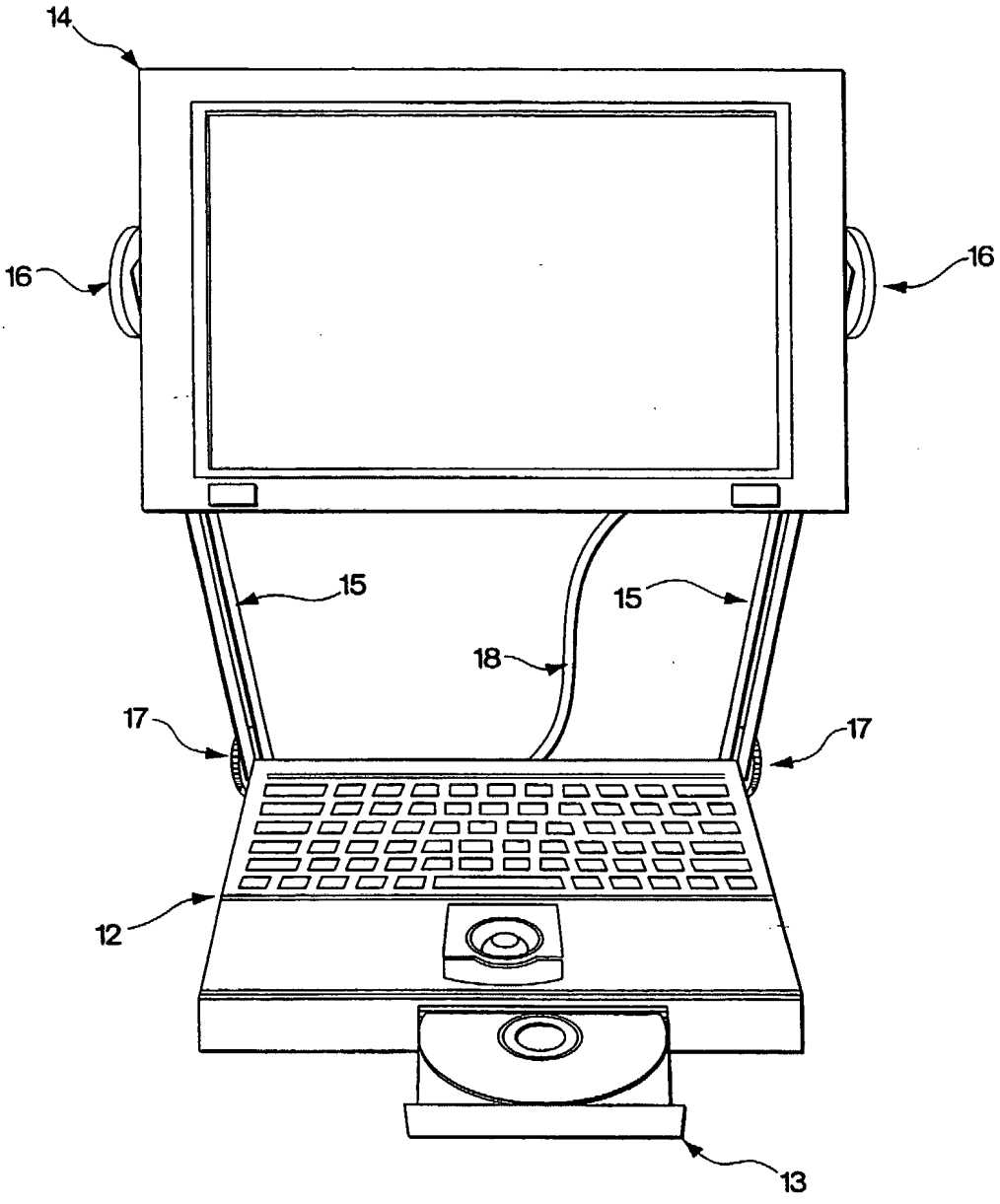

Fig. 1

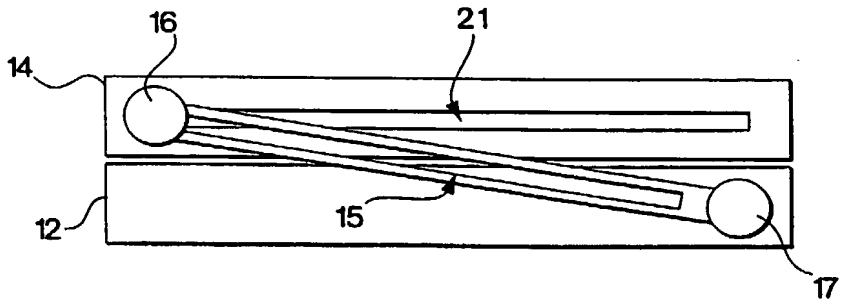

Fig. 2

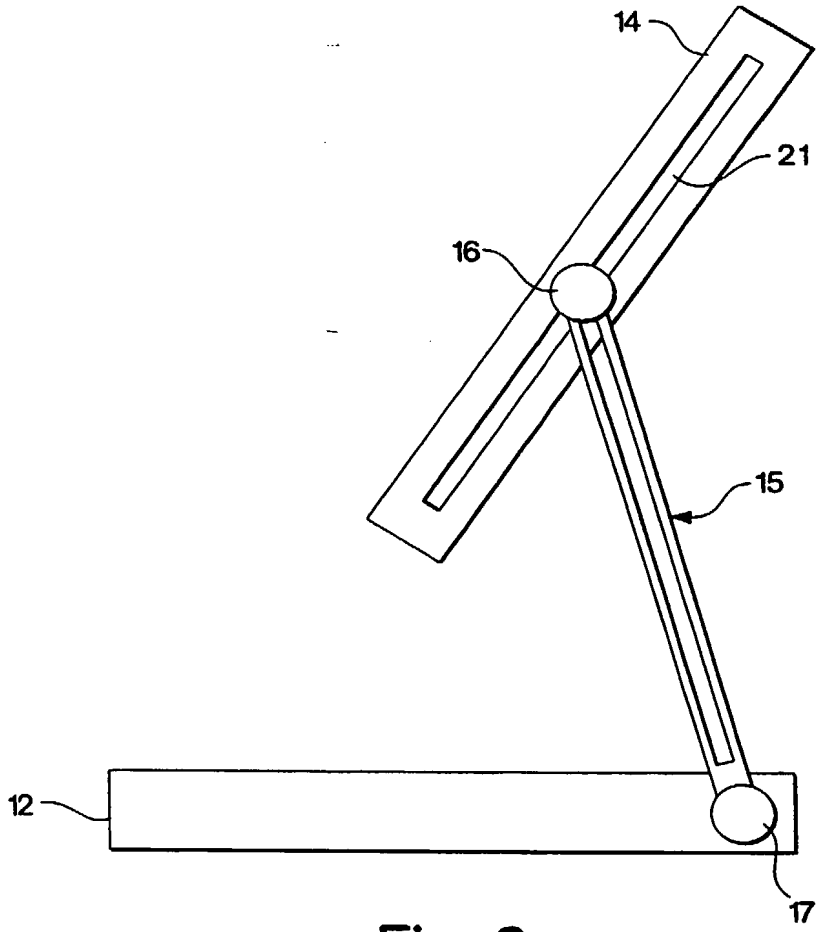

Fig. 3

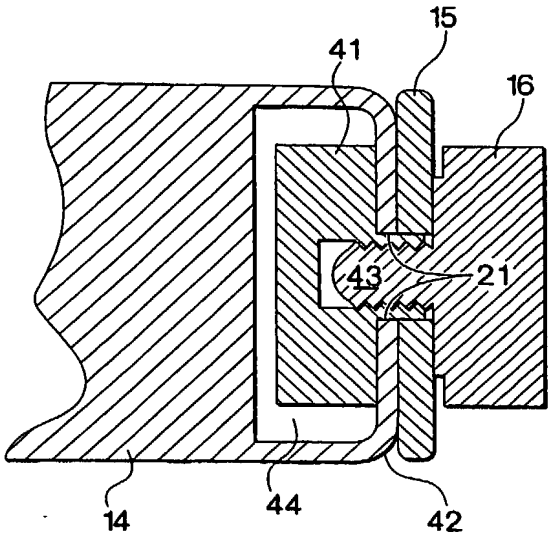

Fig. 4

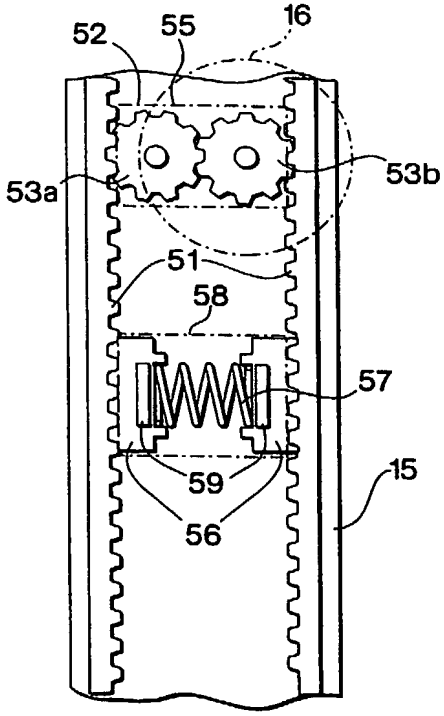

Fig. 5

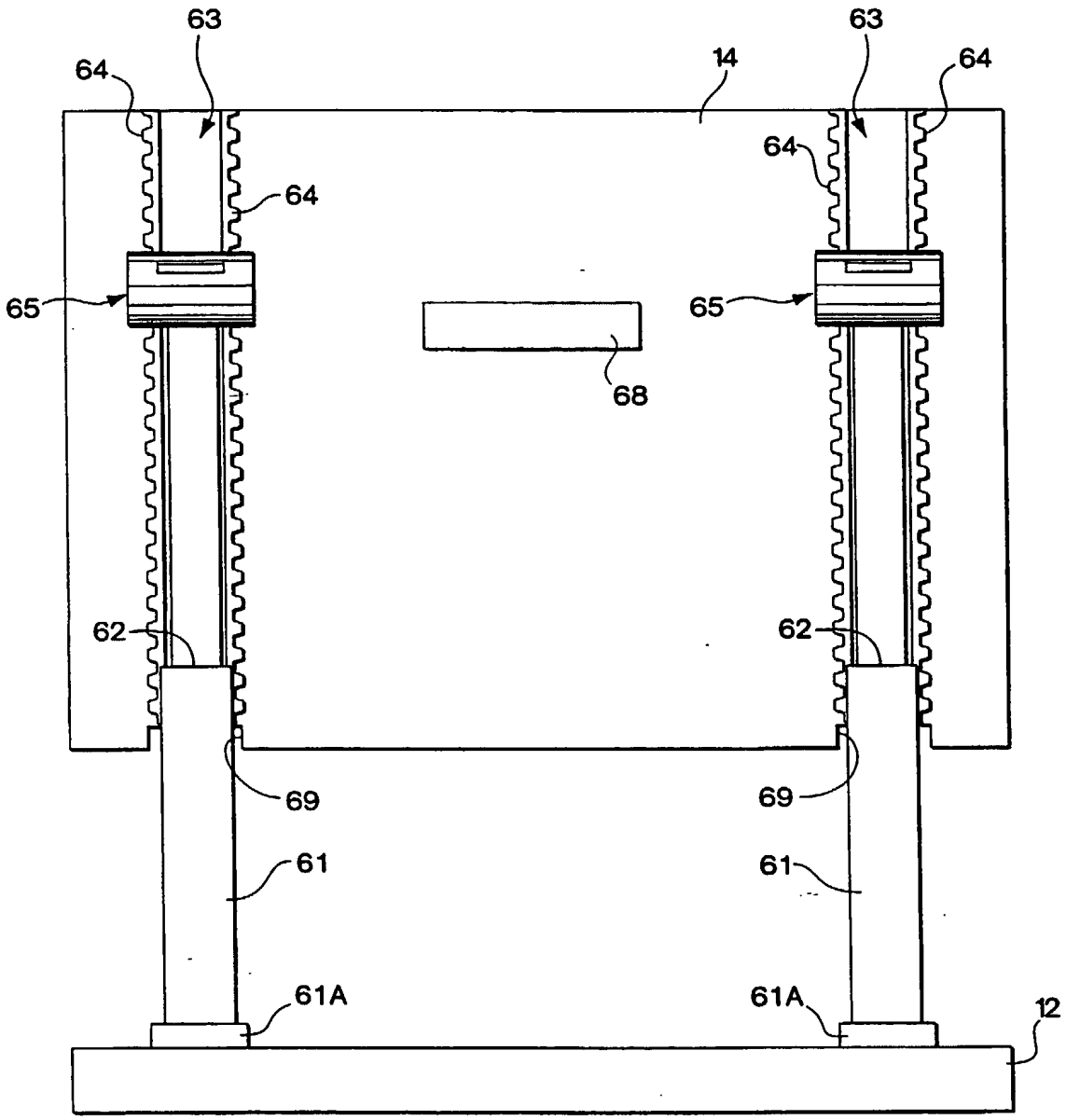

Fig. 6

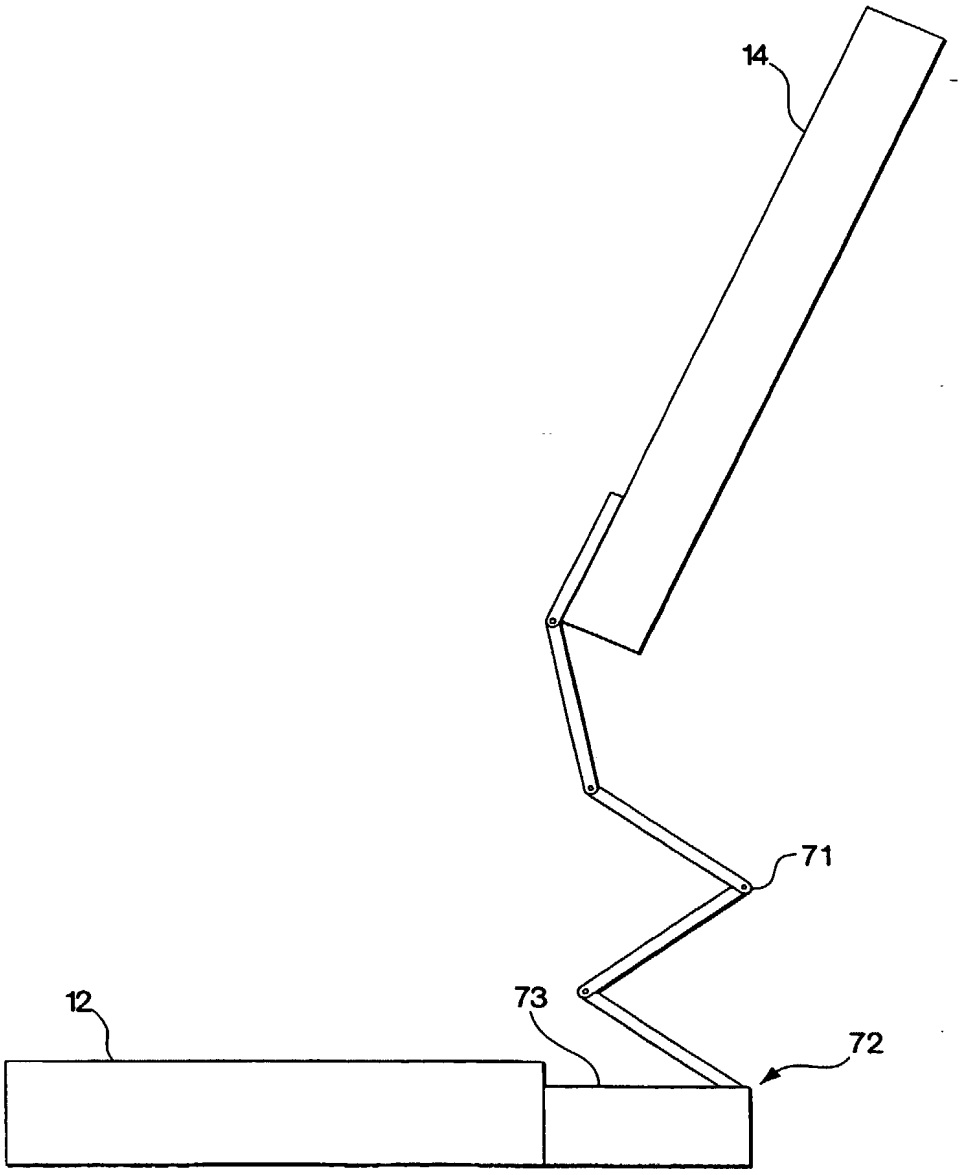

Fig. 7

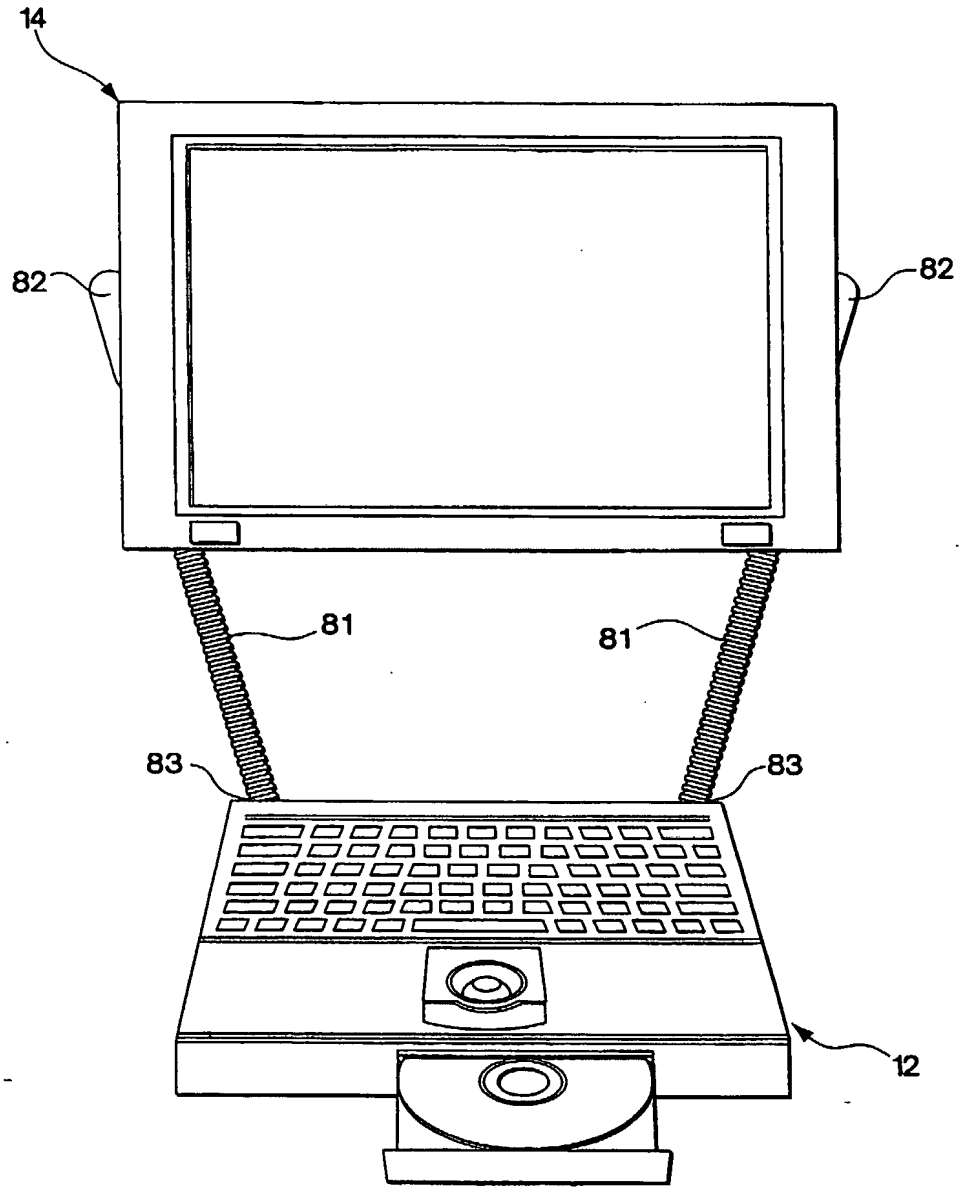

Fig. 8

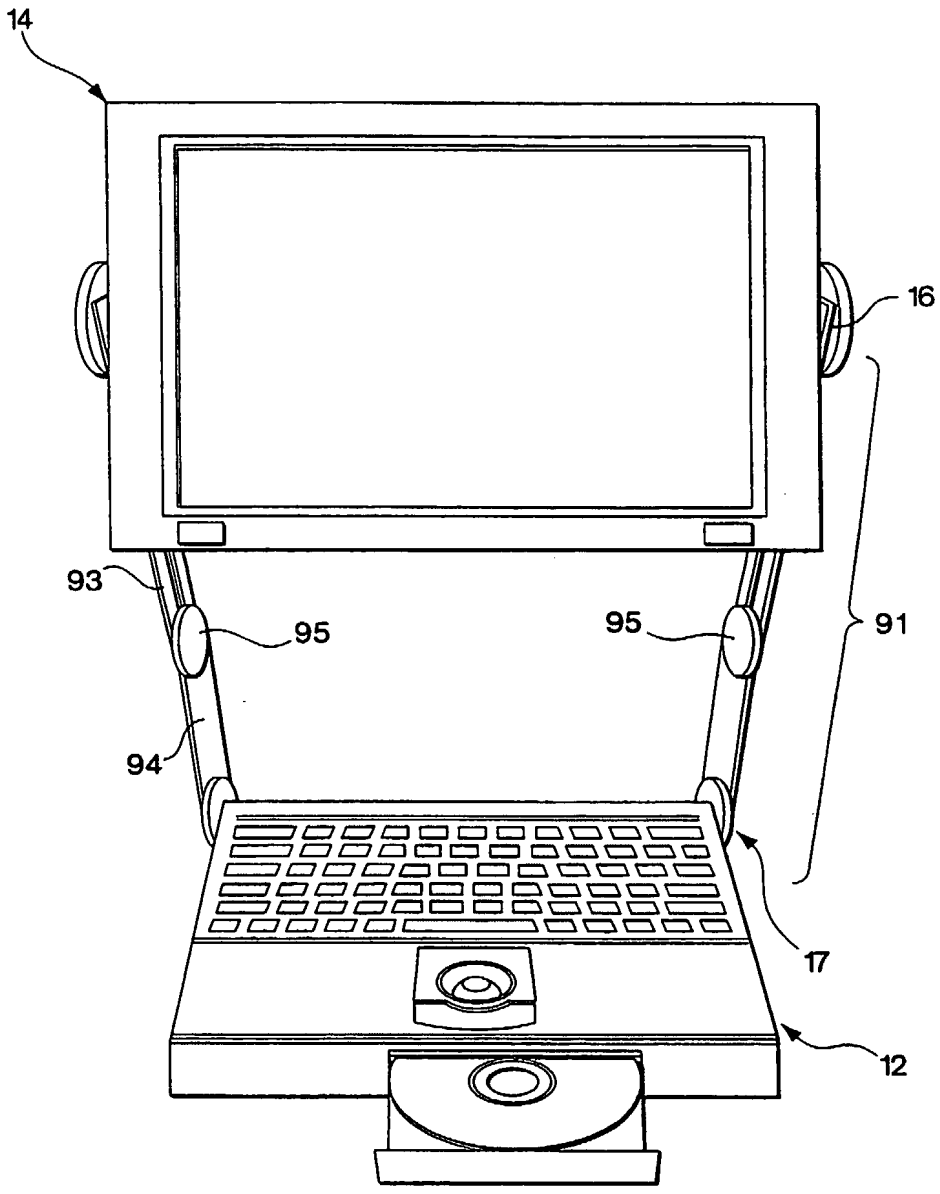

Fig. 9

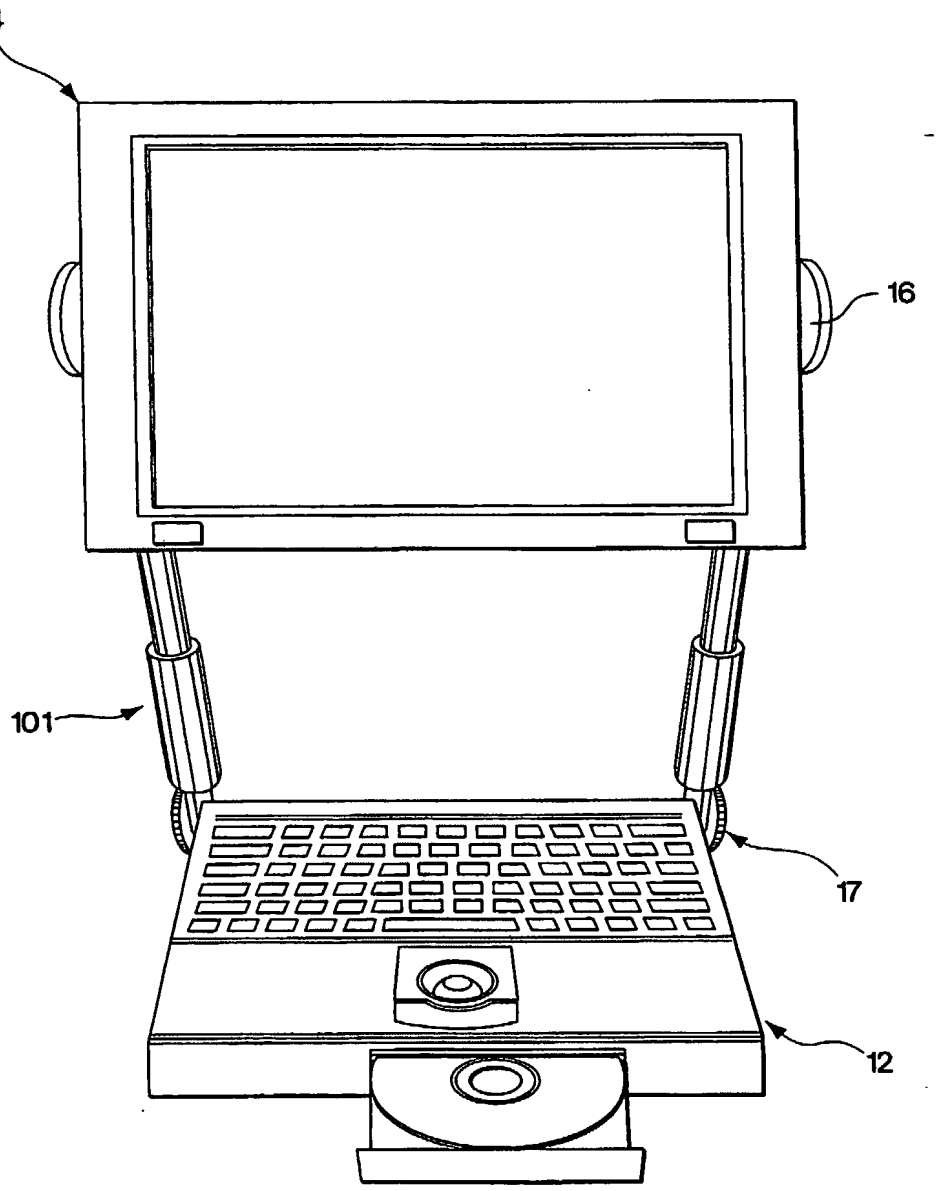

Fig. 10

INTERNATIONAL SEARCH REPORT

In. ational Application No
PCT/US 98/06816

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 G06F1/16

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	PATENT ABSTRACTS OF JAPAN vol. 096, no. 001, 31 January 1996 & JP 07 234743 A (FUNAI ELECTRIC CO LTD), 5 September 1995, see abstract	1-5,7, 12,17, 19,20
A	---	8
X	DE 41 13 178 C (TA TRIUMPH-ADLER AG) 20 August 1992 see abstract see column 1, line 1 - line 20 see column 1, line 34 - column 2, line 13 see column 2, line 32 - line 51; figures 1,2	1,2,9, 10,19,20
A	---	4,5,7
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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
24 July 1998	31/07/1998

Name and mailing address of the ISA	Authorized officer
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Form PCT/ISA/210 (second sheet) (July 1992)

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PCT/US 98/06816

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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